

FOUR NEW SPECIES OF CLUPEOID FISHES (CLUPEIDAE AND ENGRAULIDAE) FROM AUSTRALIAN WATERS

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Abstract.—Four new species of clupeoid fishes from Australian waters are described, one in the Clupeidae and three in the Engraulidae. The clupeid is *Herklotsichthys collettei* from Port Hedland, Onslow, Exmouth Gulf, and Shark Bay, Western Australia. It differs from its congeners which have similar wing-shaped median predorsal scales by having more lower arch gill rakers (38–40 cf. 29–36). Of the three new species of Engraulidae, *Stolephorus advenus* from the Cobourg Peninsula, Northern Australia is most closely related to *S. indicus*, but is readily distinguishable from that species in having a deeper body, an even shorter and broader maxilla, a shorter head, and in the lack of dark dots on the post-temporal region, and dorsal- and anal-fin bases. *Thryssa marasriae* from Shoal Bay, Darwin, and Chambers Bay, Northern Territory, is easily recognizable by the presence of a diffuse saddle blotch on the back just before the dorsal-fin origin (cf. on nape in other related species). *Setipinna paxtoni* from Cambridge Gulf, Western Australia, the only known species of the genus from Australia, is nearest to *S. tenuifilis* but is readily separable by having a humped dorsal profile, deeper body, higher dorsal fin, longer pectoral and pelvic fins, and much smaller serrae of the gill rakers.

During the course of my continuing study of Indo-Pacific clupeoid fishes, some 7000 additional specimens were examined after completion of my dissertation (Wongratana 1980). Among them, four new species were discovered. The purpose of this paper is to make the new specific names available to other workers studying phyletic relationships as well as those studying general taxonomy and population dynamics. More detailed descriptions, tables, figures and graphs for comparison with other congeneric species will be given in a monograph on Indo-West Pacific clupeoid fishes now in preparation.

Clupeoid fishes, the herrings, sardines, pilchards, sprats, shads, anchovies, and wolf-herrings, occur in all oceans and seas. Most of the approximately 317 species (Grande 1985) inhabit the continental shelves, especially near the shorelines and in estuaries. Many ascend rivers and some have become

established in strictly freshwaters. Despite their great diversity in many taxonomic features, most congeneric species and even related genera are very similar in general appearances. Many useful taxonomic characters, e.g., striations and perforations on scales, and gill raker and pyloric caecal counts, change with growth. Without the help of frequency tables and/or meristic comparisons with the lengths of the fishes, and good drawings, their identification is uncertain. Moreover, within the Indo-Pacific region alone, no fewer than 300 nominal species have been proposed for these fishes, creating many difficulties in identification.

The new species were encountered in areas which were infrequently fished, surveyed, or sampled; therefore it is foreseeable that many clupeoid species from other poorly collected regions throughout the Indo-Pa-

cific or the world still remain to be described. At the same time the distributional pattern of each species needs to be clarified by examination of specimens in systematic collections.

Specimens examined for this study are deposited in the following institutions: the Australian Museum, Sydney, (AMS); the Commonwealth Scientific and Industrial Research Organization, Hobart, (CSIRO); the Northern Territory Museum, Darwin, (NTM); the Western Australian Museum, Perth, (WAM), and the National Museum of Natural History, Smithsonian Institution, Washington, D.C. (USNM).

Herklotsichthys collettei,

new species

Figs. 1, 6

Holotype.—WAM P25464-004, 108 mm standard length (SL), Shark Bay, Western Australia (WA), 26°10'S, 113°11'E, Aug 1975; Fish and Wildlife party.

Paratypes.—43 specimens. WAM P25464-002, (6, 100–107), same data as for holotype. AMS IB1637, (1, 90), Port Hedland, WA; CSIRO. CSIRO C2880-81, (18, 85–98), Port Hedland, WA, 22 Aug 1949; FRV *Warreen*. CSIRO C2895, (12, 91–103), Port Hedland, 1 Sep 1949; FRV *Warreen*. WAM P22574, (1, 98), Shark Bay, WA, 25°21'S, 113°44'E, 20 Jan 1973. WAM P23870 (1, 97), Exmouth Gulf, WA, 22°05'S, 114°15'E, Aug 1973; R. Rowe. WAM P2544-45, (2, 59–67), Onslow, WA, 21°38'S, 115°07'E, Nov 1943; S. Fowler. WAM P26667-001, (1, 43), south passage off Wright's Anchorage, Shark Bay, WA, 26°10'S, 113°11'E, 12 Apr 1979; B. Hutchins. WAM P27380-001, (1, 91), Shark Bay, WA, 25°21'S, 113°44'E; R. McKay.

Diagnosis.—A species of *Herklotsichthys* with elongate wing-shaped scales beneath normal paired predorsal scales. Body moderately compressed, elongate, its depth 27–32% SL. Gill rakers on first arch 15–18 + 38–40, rarely to 42. Granular patches and very narrow series of teeth on palatines and

pterygoids. Pyloric caecae about 60 to 85. Scales on nuchal and temporal regions with dense patches of anastomosing canals; posterior edges of scales on body unserrated but somewhat ragged. One or more fine lines from temporal region to caudal peduncle; extreme tip of dorsal fin jet black, tips of first three unbranched rays dark and apparently forming a broken dark line at front edge of fin, caudal fin without any prominent marking.

Relationships.—Among the 10 known species of *Herklotsichthys* this new species most closely resembles the sympatric *H. quadrimaculatus*, *H. lippa* and *H. koningsbergeri* at its type locality, especially in the possession of wing-shaped median predorsal scales. *Herklotsichthys castelnaui*, *H. blackburni*, *H. gotoi*, *H. lossei*, *H. spilurus*, *H. punctatus* and *H. dispilonotus* have, however, somewhat rounded median predorsal scales under the paired ones. These three species are readily characterized by their lower counts of lower arch gill rakers (29–36). It is also noteworthy that the anastomosing canals at the temporal region are similarly developed in the last two related species; however, both are further easily distinguished from *H. collettei* by having series of dark spots along the flanks. *Herklotsichthys koningsbergeri* is further differentiated by having a deeper body (33–41% SL) and with definitely higher counts of pyloric caecae (100 to 140).

It is now known that most specimens smaller than 60 mm SL and occasional larger ones of *H. lippa* (see species A and B of Whitehead 1985) have no characteristic dark spots along the sides or these markings are not pronounced. This may cause problems in identification and the other characters mentioned are therefore needed.

At first glance, *H. collettei* may also look like *H. blackburni* which also occurs along the coasts of the Western Australia, *H. castelnaui* (also *H. species C* of Whitehead 1985) of Queensland and New South Wales, *H. lossei* of the Persian Gulf and *H. spilurus*

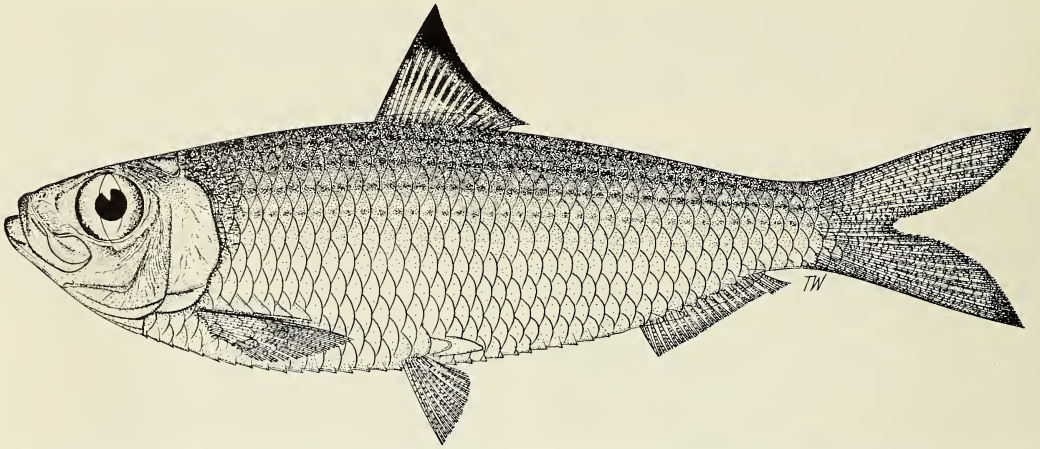


Fig. 1. *Herklotsichthys collettei*, new species, holotype, WAM P25464-004, 108 mm SL; Shark Bay, Western Australia.

of Zanzibar to Réunion Island, in general body form and especially the black tip of dorsal fin, but they differ in the shape of predorsal scales as noted above.

Etymology.—This species is named after Dr. Bruce B. Collette, Director of the National Marine Fisheries Service Systematics Laboratory in appreciation for his hospitality, encouragement, and interest in my work on Indo-Pacific clupeoid fishes, as well as his help during the course of my research in his laboratory.

Distribution.—Known from Port Hedland, Onslow, Exmouth Gulf, and Shark Bay, Western Australia.

Stolephorus advenus, new species
Figs. 2, 3, 6

Holotype.—NTM S10031-153, 72 mm SL, 27 m, north of Saulte Point, Cobourg Peninsula, Northern Territory, 18 Oct 1981; H. Larson.

Diagnosis.—*Stolephorus* (s.s. Nelson 1983) with short maxilla of 15.3% SL, and blunt point at tip which falls slightly short of anterior border of preoperculum; part posterior to the second supra-maxilla slightly deeper than long. Body moderately compressed, depth about 19.4% SL, head short 22.6% SL. Isthmus entirely covered with

stenohyoideus muscle, urohyal not exposed. Gill rakers 19 + 24 on first arch, with 4 short rakers on posterior face of 3rd epibranchial. Hind border of preoperculum evenly rounded, without indentation at posteroventral edge. Small patches of teeth on palatines and pterygoids, no toothed knob at inner base of anterior gill rakers on epibranchials. Eleven branchiostegal rays, 3 attached to posterior ceratohyal, latter having entire upper edge. Lateral scale series 40, needle-like pre-pelvic scutes 5. Dorsal-fin rays iii 15, anal-fin rays iii 16, origin of anal fin commencing below 11th dorsal-fin ray, tip of pelvic fins (if not lost) reaching just before dorsal origin. Vertebrae 22 + 20.

Relationships.—The absence of an indentation at the posteroventral edge of the preoperculum and blunt tip of maxilla which terminates a short distance before anterior border of preoperculum easily distinguishes *S. advenus* from *S. holodon* (from east coast of Africa), *S. andhraensis* (from Bengal Bay to Gulf of Papua and northern coast of Australia), *S. carpentariae* (from the Gulf of Papua and northern coast of Australia), *S. ronquilloi* (from Taiwan and South China Sea) and *S. insularis* (from east coast of Africa to Taiwan and South China Sea). On the other hand, this new species also differs

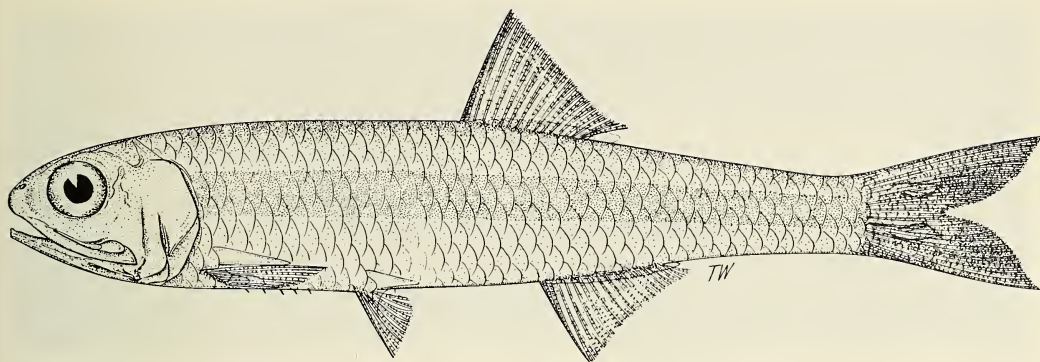


Fig. 2. *Stolephorus advenus*, new species, holotype, NTM S10031-153, 72 mm SL; north of Saulte Point, Cobourg Peninsula, Northern Territory, Australia. The pelvic fin is reconstructed.

from *S. insularis*, *S. dubiosus* (from Bengal Bay, Thailand, Malay Peninsula and Indonesia), *S. baganensis* (from Thailand, Malay Peninsula and South China Sea) and *S. tri* (from Thailand, Malay Peninsula and Indonesia) in the absence of a tiny spine in front of the dorsal-fin origin and between the pelvic-fin base, as well as in its much shorter maxilla. Among the remaining species in the genus, *S. indicus* (from east coast of Africa to South China Sea and South Pacific), *S. apiensis* (from Samoa and Fiji), *S. commersonii* (also from east coast of Africa to South China Sea and South Pacific), *S. apiensis* (from Samoa and Fiji), *S. commersonii* (also from east coast of Africa to South China Sea and South Pacific), *S. brachycephalus* (from the Gulf of Papua and northern coast of Australia), *S. chinensis* (from Thailand, Malay Peninsula and South China Sea) and *S. waitei* (from west coast of India to South China Sea and northern coast of Australia), *S. advenus* might only be confused with *S. indicus* in its bluntly short maxilla, the number of gill rakers, and the pelvic-fin tip which lies entirely before the dorsal-fin origin. These two species, however, differ from each other in many characters, the most notable being the complete separation in the depth of body (19.4% SL in *S. advenus* vs. 16.6–19.3% SL in 105 specimens of *S. indicus*; Wongratana 1980, 1985). The new species also has a relatively

broader and shorter maxilla (15.5–17.5% SL in *S. indicus*), furthermore, it has a shorter head (23.5–26.1% SL in *S. indicus*), and fewer branchiostegal rays (22 vs. 12–14 in *S. indicus*).

Stolephorus pacificus from Guam and Kosrae (Kusaie), recently described by Wayne J. Baldwin (1983), also has a short maxilla (15.8–16.7% SL), which is slender in shape; it is, however, different from the new species in its higher gill-rakers counts (21–27 + 35–38) and approaches only *S. apiensis* (19–23 + 29–31). Baldwin's *Stolephorus* species as well as *S. apiensis* and also *S. indicus* have series of dark dots at the bases of the dorsal and anal fins, and a dark patch in the post-temporal region, that are absent in my new species.

Having examined more than 3000 specimens of *Stolephorus* (excluding those of *Encrasicholina*, Nelson 1983, s.s.) from most parts of the Indo-Pacific, I am certain that although my conclusions are based on a single specimen, it is nonetheless specifically different from other known species, in spite of its abnormal loss of pelvic fins, only the lateral ascending arms remain on both sides (Fig. 3) and the loss of the fourth needle-like pre-pelvic scute. Two tiny scute-like elements which lie behind the fifth pre-pelvic scute are possibly the malformed broken bones of the pelvic girdle. This conclusion is drawn from the fact that they are

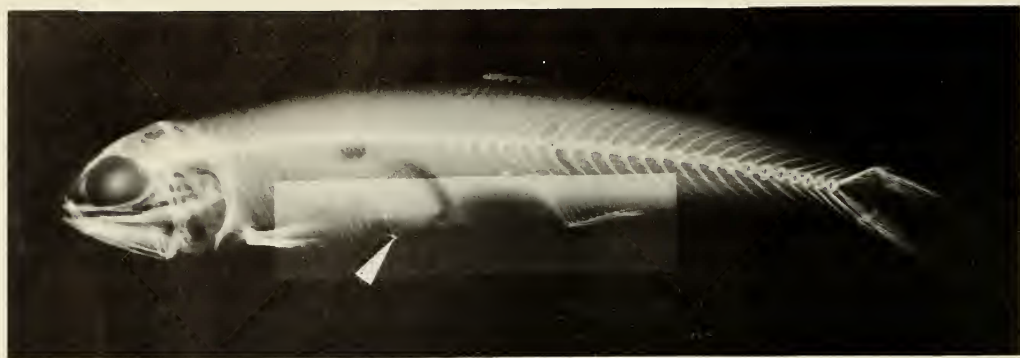


Fig. 3. Negative print made from radiograph of *Stolephorus advenus*, new species, holotype, same data as for Fig. 2, showing the position of pelvic girdle (arrow).

within the site of actual pelvic girdle, and no pre-pelvic scutes of any *Stolephorous* species have been found to develop at this area.

It is also worthwhile to note here that the specimen of this new species was found among 6 specimens, 75.0–79.5 mm SL, of *Stolephorus waitei* (NTM S10031-100).

Etymology.—The specific epithet *advenus*, from the Latin for a stranger, is in reference to its peculiar taxonomic feature that make it uniquely different from other congeneric species.

Distribution.—Known only from the type locality.

Thryssa marasriae, new species

Figs. 4, 6

Holotype.—NTM S10707-002, 66.5 mm SL, King Creek, Shoal Bay, Northern Territory (NT), 12 Jun 1975; Northern Territory Fisheries.

Paratypes.—37 specimens. NTM S10707-001, (8, 48–66.5), same data as for holotype. NTM S10094-001, (9, 50.5–60), Darwin, NT, 22 Aug 1972; NT Fisheries. NTM S10095-001, (2, 49–57.5), Chambers Bay, NT, 5 May 1977; NT Fisheries. NTM S10102-002, (8, 58–68.5), King Creek, Shoal Bay, NT, 26 Jun 1975; NT Fisheries. NTM S10216-002, (5, 59.2–65.8), King Creek, Shoal Bay, NT, 15 May 1975; NT Fisheries. NTM S10259-005, (4, 40–61.8), Shoal Bay,

NT, 15 Nov 1973; NT Fisheries. USNM 278480, (1, 49.5), NT, 1972–1977.

Diagnosis.—Small species of *Thryssa* with short body, its depth 29–33% SL, belly with 15–16 + 8–9, total 23–25 keeled scutes from isthmus to anus. Maxilla short, reaching about to hind border of preoperculum, first supra-maxilla long. Gill rakers on first arch 21–23 + (rarely 24) + 25–28, its serrae not clumped. Anal-fin rays iii–iv 26–28. Scales in lateral series about 33 to 35, sampled scales vertically above anal origin at axis of body with continuous transverse striae. Diffuse dark saddle blotch on back uniquely located near dorsal-fin origin.

Relationships.—*Thryssa marasriae* resembles *T. rastrosa* (Fly and Strickland rivers of New Guinea), *T. brevicauda* (Fly River of New Guinea and Shoal Bay of Northern Territory), *T. aestuaria* (northern coast of Australia to Grafton, New South Wales), *T. kammalensis* (Gulf of Thailand, Malay Peninsula, Java Sea and Celebes) and *T. scratchleyi* (rivers in New Guinea, Roper River of Northern Territory and Mitchell River, Queensland) in general appearances, especially the short maxilla. However, the first and the last mentioned species have no saddle blotch on the nape or before the dorsal fin, and have much higher gill-raker counts (33–45 + 48–61) in *T. rastrosa* or lower counts (17–20 + 18–23) in *T. scratchleyi*. *T. marasriae* is further differentiated

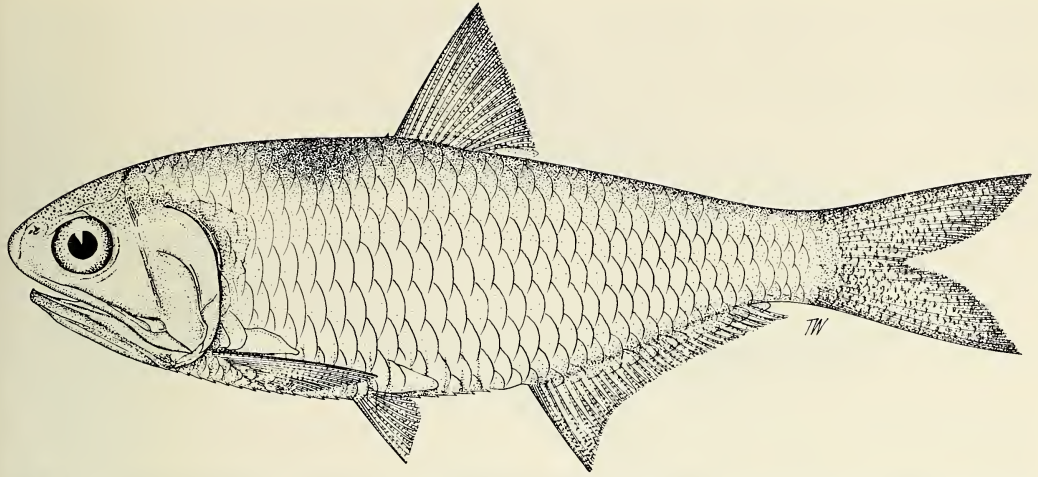


Fig. 4. *Thyryssa marasriae*, new species, holotype, NTM S10707-002, 66.5 mm SL; King Creek, Shoal Bay, Northern Territory, Australia.

from the three remaining species in the placement of the diffuse saddle blotch which is just before the dorsal fin, instead of distinctly on the nape as found also in *T. che-fuensis* (South Korea to Hong Kong), *T. kammalensoides* (Godavari estuary, India) and *T. dussumieri* (Pakistan to Southeast Asia and Taiwan). The sympatric *T. brevicauda* is further readily distinguishable from this new species by its reticulate striation on scales. Taxonomically, *T. marasriae* is closely related to *T. aestuaria*, but the latter fish significantly differs in the higher counts of lateral scale series (37 or 38), and also more anal-fin rays (iii–iv 31–34).

Etymology.—Named *marasriae* in recognition of my wife Marasri Ladpli Wongratana for her patient sharing of my study of fishes, her encouragement, and her tolerance of my trips away from home.

Distribution.—Shoal Bay, Darwin, and Chambers Bay, Northern Territory, Australia.

Setipinna paxtoni, new species
Figs. 5, 6

Setipinna papuensis, Wongratana, 1980:302 (unpublished revision).

Holotype.—WAM P16267-100, 110 mm

SL, Medusa Bank, Cambridge Gulf, WA, 2 Mar 1968; K. Godfrey.

Paratypes.—WAM P16268-70-001, (3, 80.5–109), same data as for holotype.

Diagnosis.—Only known species of *Setipinna* from Australia. Dorsal profile distinctly humped. Body well compressed, its depth 33.2–34.6% SL, belly with 18–19 + 7–8, total 25–27 keeled scutes from isthmus to anus. Dorsal fin originating above base of sixth to eighth anal-fin rays, its height 21–23.4% SL; anal-fin rays iii 51–54; tip of main pectoral fins reaching to anal origin or nearly so, its filament greatly produced and reaching to base of 27th to 41st anal fin ray; pelvic-fin length 9.0–9.7% SL and reaching to anus. Gill rakers 10–11 + 14–15, most serrae small, only few enlarged but not distinctly clumped. Lateral scale series 43 or 44. Tip of dorsal fin, distal half of pectoral fins and pyloric caecae blackish.

The degree of convexity of the dorsal profile body depth and length of the pectoral filament in *S. tenuifilis gilberti* (from North China Sea), *S. tenuifilis tenuifilis* (from the Bay of Bengal to Sarawak and Gulf of Papua) and *S. paxtoni* progressively increase. The position of the anal-fin origin in relation to that of dorsal is also more forward in the latter species. *Setipinna melanochir*

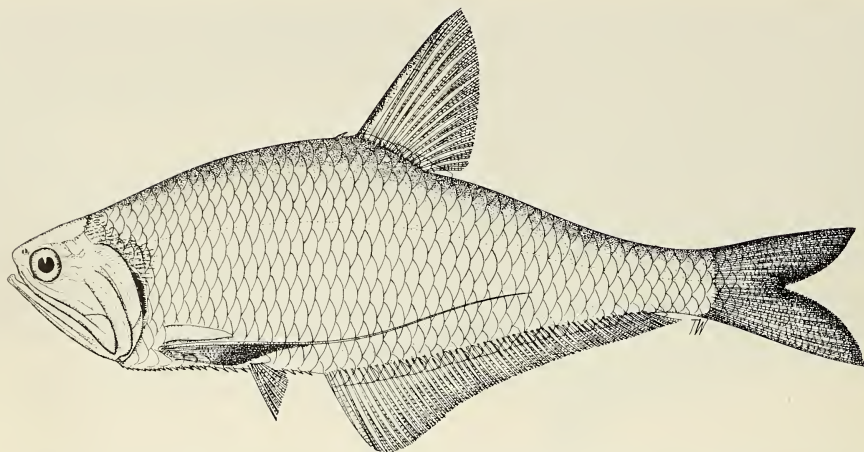


Fig. 5. *Setipinna paxtoni*, new species, holotype, WAM P16267-100, 110 mm SL; Medusa Bank, Cambridge Gulf, Western Australia.

(from South China Sea and Java Sea) differs chiefly in having fewer gill rakers (only 7–10 + 9–12), more lateral scale series (45 to 51) and more ventral scutes (21–26 + 8–10, total 30–35). In comparing the new species with the very common congeneric species, *S. taty* (Bay of Bengal, South China Sea and Java Sea), the latter has the dorsal and anal fins uniquely covered with scales (this character is so far unknown in any other clupeoid species), it has more gill rakers (13–

17 + 18–20) and more ventral scutes (20–29 + 9–14, total 32–40).

Etymology.—It is a pleasure to name this species for Dr. John R. Paxton of the Australian Museum, Sydney, who arranged the opportunity for me to broaden my knowledge of Australian clupeoid fishes.

Distribution.—Only known from the type locality, Medusa Bank, Cambridge Gulf, Western Australia.

Comments.—Re-examination of the type series including the holotype (CSIRO C3246) of *S. papuensis* Munro, 1964, leads me to treat this name as a junior synonym of *S. tenuifilis*, belonging to the subspecies *S. tenuifilis tenuifilis* (Wongratana 1980, 1983; Whitehead 1985).

Acknowledgments

The specimens that served as the basis for this paper were made available by Dr. Barry C. Russell (NTM), Dr. Gerald R. Allen (WAM) and Mr. Ian S. R. Munro (CSIRO). My special thanks go to Dr. John R. Paxton (AMS) who initiated the study and made possible the financial support for my stay in Sydney. Travel expenses between Bangkok and Sydney were provided by Thai Airways International Ltd. This work ben-

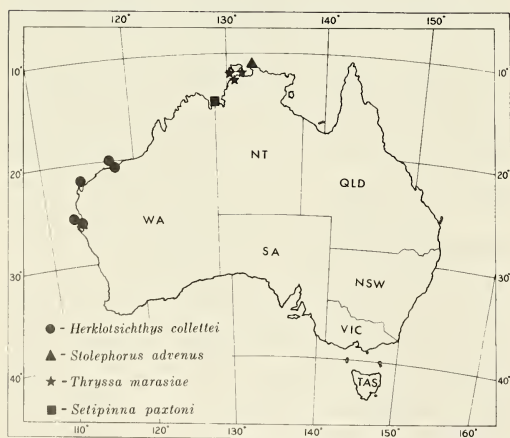


Fig. 6. Map of Australia showing the distribution of *Herklotsichthys collettei*, *Stolephorus advenus*, *Thyssa marasiae*, and *Setipinna paxtoni*, new species.

effited from the suggestions and criticisms of Dr. Bruce B. Collette (NMFS) and Dr. Peter J. P. Whitehead (BMNH). Acknowledgment is gratefully extended to Dr. Gareth Nelson (AMNH) for his valuable comments, and hospitality during my visit to that museum. He was also very helpful in preparing the radiograph of *Stolephorus advenus*. This paper forms a portion of my revision of the Indo-Pacific clupeoid fishes supported by a Smithsonian Post-doctoral Fellowship. Drafts of the manuscript were typed by Arleen S. McClain and Virginia R. Thomas. Ruth Gibbons and Betsy Washington helped in preparing the photographs of my drawings and the print of the radiograph.

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